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AN EVALUATION OF TREE MORTALITY ON TWO PRESCRIBED BURNS, PLACERVILLE RANGER DISTRICT, ELDORADO NATIONAL FOREST

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ABSTRACT

Two stands on the Placerville Ranger District that experienced high mortality after being underburned were evaluated by specialists in fire, timber, and pest management. The combined mortality on the two units, which covered 400 acres, totaled 500 MBF. Some of this mortality was caused directly by fire-killed cambium and crown, but most was due to insects successfully colonizing stressed trees. Unacceptable mortality in future burns could be reduced by using different fire prescriptions, and by reducing basal areas of overstocked stands and/or removing brush competition prior to burning.

INTRODUCTION

On December 13, 1983, personnel from the Placerville Ranger District, Eldorado National Forest Supervisor's Office, and the Regional Office visited two prescribed burns in the Caldor area. Among those individuals present were specialists in fire, timber, and pest management. The two burns included 400 acres of low-elevation pine and mixed conifer forest. One area had been burned in spring 1982, and the other in spring 1983. The basic objective of each prescribed fire was fuels reduction.

The Placerville District requested this evaluation because of an apparent high level of tree mortality that occurred immediately after the fire and additional mortality that continued into the second year after

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the 1982 burn. Initial field observations by District personnel identified successful insect attacks by the western pine beetle, fir engraver, and red turpentine beetle. The amount of standing dead timber estimated in the two burns at the time of the evaluation was 500 MBF. Twenty percent of this mortality was due directly to the fire, and the remainder was due to fire injury and subsequent insect activity. The objectives of our evaluation were to summarize the conditions contributing to fire-related tree mortality in the Caldor burns and provide information that could be used in planning future prescribed fires.

OBSERVATIONS AND DISCUSSION: CURRENT MORTALITY

Certainly, fire injury and bark beetles, primarily the western pine beetle, were associated with the tree mortality observed in both burns. However, factors independent of the fire contributed to tree stress and reduced vigor, thereby helping to create conditions conducive to successful attacks by bark beetles. In the Caldor area, overstocked aggregations and brush competition (particularly bear clover) were common. Even without the stress caused by the fires, these stands were susceptible to bark beetle attack, as evidenced by a history of recurrent bark beetle-related mortality in this general area. In these situations, the added stress of fire injury greatly increases the likelihood of mortality due to bark beetles.

Another complicating factor involves insecticide trials to control the western pine beetle that were being conducted in the 1982 burn area by the Pacific Southwest Station. These trials involved baiting ponderosa pine with western pine beetle pheromone and then applying an insecticide treatment; control trees were baited but not treated. Treatments were applied in July 1982, Sept.-Oct. 1982, and July 1983. The area was burned in May 1982. Some pine mortality (single-tree) was caused by the study; but, the impact of these trials on local bark beetle population dynamics and total tree mortality after the fire is unknown.

Certain locations within the 1983 fire burned much hotter than was prescribed. The fire-kill in one spot was extensive enough to require a 19-acre salvage clear cut. Even though the trees in these areas died because of cambium and crown scorch, they still can provide brood material for future bark beetle generations that may endanger the currently stressed stand. Such excessively intense fire conditions are technically avoidable but are not uncommon.

CONCLUSIONS - FUTURE BURNING

The following points were made during discussions both at the burn sites and in the District office:

1. Separating treatment units burned in consecutive years by some arbitrary distance would probably not have a significant affect on bark beetle distribution, population dynamics, or bark beetle-related mortality in the Caldor area. This is due to both the endemic beetle population and the ability of bark beetles to fly long distances.

2. Treatments such as logging, mechanical thinning and fuels reduction by burning put trees under stress, and it probably takes 3 to 4 years for trees to recover and show a response. Therefore, re-treating areas before this recovery period is over would just cause additional tree stress and probable mortality. Fire management and silvicultural treatments must be coordinated and compatible.

3. A closer economic look at these two burns might show that losing 500 MBF over 400 acres is acceptable, considering the benefits that are gained. One problem with the Caldor burns, and most others, is that mortality tends to occur in groups rather than in single-tree distributions.

4. Reducing overstocking and lowering brush competition, at least 3-5 years prior to burning, would increase residual tree vigor and help to reduce successful bark beetle attacks. This would apply to existing stands whether they are burned or not.

5. The technology and expertise is available to reduce the amount of fire damage to crop trees. Improving control over the fire, and changing prescriptions to include night or fall burning are some alternatives.

6. It is important to set clear fire management and silvicultural goals before units are burned in order to define what is and what is not acceptable.

7. The question of how long insect-caused mortality may continue in a given area following prescribed fires is not answerable at this time. Forest Pest Management is currently trying to evaluate the variables associated with unacceptable pest-related mortality following prescribed fires. The objective of this work is to develop guidelines to reduce losses. The variables involved for each burn, including site quality, stocking, tree size, tree species, insect species and intensity of burn, make it difficult to compare insect-related mortality trends from one fire to another.